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THREE PUZZLES ABOUT DENOMINAL ADJECTIVES IN *-EUX*

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1. Introduction If we leave apart about fifty adjectives coming or adapted from Latin (cf. (1)) and a handful of others resulting from the merging of the two suffixes *-EUR* and *-EUX* in Old French and dialects (cf. (2)), all French adjectives ending in *-EUX* are morphologically constructed on a nominal basis, as examples (3) show :

- | | | | |
|-----|---------------------|--------------------------|--------------------------------|
| (1) | <i>belliqueux</i> | ‘quarrelsome, bellicose’ | < Lat. <i>bellicosus</i> |
| | <i>frileux</i> | ‘sensitive to cold’ | < late Lat. <i>frigorosus</i> |
| | <i>judicieux</i> | ‘judicious’ | < learned Lat. <i>judicium</i> |
| (2) | <i>pét-eux</i> | ‘pretentious’ | <i>péter</i> ‘to fart’ |
| | <i>gât-eux</i> | ‘doddering’ | <i>gâter</i> ‘to spoil’ |
| (3) | <i>lait-eux</i> | ‘milky’ | <i>lait</i> ‘milk’ |
| | <i>poussièr-eux</i> | ‘dusty’ | <i>poussière</i> ‘dust’ |
| | <i>paress-eux</i> | ‘lazy’ | <i> paresse</i> ‘lazyness’ |

As (Bally 1965) noticed, this latter property is shared by all the so-called ‘relational adjectives’, a small sample of which is given in (4).

- | | | | | |
|-----|----------------------|----------------|------------------|-------------|
| (4) | <i>président-iel</i> | ‘presidential’ | <i>président</i> | ‘president’ |
| | <i>crân-ien</i> | ‘cranian’ | <i>crâne</i> | ‘skull’ |
| | <i>totém-ique</i> | ‘totemic’ | <i>totem</i> | ‘totem’ |

From these facts, one might have thought that denominal adjectives would uniformly behave like relational adjectives. However, this expectation is not satisfied. Relational adjectives are known to have distributional properties that depart from those of ordinary qualifying adjectives. As examples (5) show, they cannot be predicated, they do not accept degree modifiers, and they give poor results when they are co-ordinated with a qualifying adjective.

- | | | | |
|-----|---|---|---------------------------------|
| (5) | a | * <i>Ce fauteuil est présidentiel.</i> | ‘This armchair is presidential’ |
| | b | * <i>Voici un ours très polaire.</i> | ‘Here is a very polar bear’ |
| | c | * <i>Un champignon parfumé et laitier</i> | ‘A perfumed and dairy mushroom’ |

On the contrary, adjectives suffixed by *-EUX* generally behave as plain qualifying adjectives, as illustrated in (6).

- | | | | |
|-----|---|--|---------------------------------|
| (6) | a | <i>Ce champignon est laiteux.</i> | ‘This mushroom is milky’ |
| | b | <i>C’est un champignon très laiteux.</i> | ‘It’s a very milky mushroom’ |
| | c | <i>Un champignon parfumé et laiteux</i> | ‘A perfumed and milky mushroom’ |

Quite often, they are considered such prototypical qualifying adjectives that their denominal origin remains unnoticed (Vendler 1968; Bolinger 1967). In this respect, they constitute a well identified subpart of the class of denominal adjectives. For this reason, their study seems to be a good starting point to understand the role played by morphology in the elaboration of the meaning of the so-called ‘relational adjectives’ as a whole. The aim of this paper is to propose a semantic analysis that could deal with the behaviour of all types of denominal adjectives in *-EUX*. Achieving this task imposes to solve two puzzles : the first one concerns the behaviour of relational adjectives relatively to the behaviour of ordinary qualifying adjectives. The second one concerns the non canonical behaviour of adjectives suffixed by *-EUX* relatively to the majority of denominal adjectives.

2. Corbin & Corbin’s analysis (Corbin & Corbin 1991: 116) argue that the contrast illustrated in minimal pairs (7) and (8) results from the semantic instruction associated with *-IER* and *-EUX* suffixation respectively. The former only requires that a pragmatic link could be established between the referent denoted by the base noun (BseN) and the referent of the NP’s head noun (HdN), while the latter transfers properties that must be sensorially perceived from the base noun to the head noun.

- | | | | |
|-----|---|--------------------------------|-----------------------------|
| (7) | a | <i>industrie laitière</i> | ‘milk industry’ |
| | b | <i>vache laitière</i> | ‘cow milk’ |
| | c | <i>production cotonnière</i> | ‘cotton production’ |
| (8) | a | * <i>industrie laiteuse</i> | ‘dairy industry’ |
| | b | * <i>vache laiteuse</i> | ‘dairy cow’ |
| | c | * <i>production cotonneuse</i> | ‘downy / fluffy production’ |

Terminology: NP with a denominal adjective (NPDA) e.g. *industrie laitière*, base noun (BseN) e.g. *lait*, head noun (HdN) e.g. *industrie* (in French *nom recteur*).

In (7), the meaning of the HdN offers several potential semantic relationships. The selection of the relevant one depends both on the meaning of the BseN and on pragmatic and encyclopaedic knowledge. For instance, since industry involves using raw material and as far as milk can play the role of raw material, (7a) means ‘industry which makes products from milk’. Using similar patterns, we get the interpretation ‘cow which produces milk’ for (7b) and ‘production of cotton’ for (7c).

As for *-EUX* suffixation, (Corbin & Corbin 1991; Mélis-Puchulu 1991) claim it applies to nouns that denote objects (or substances) that can be sensorially perceived. This is neither the case for industry nor production, since both of these N denote abstract realities (Flaux & Van De Velde 2000). Hence the ungrammaticality of (8a, c). This is not the case of (8b), which nevertheless sounds very weird because it is very uncommon to say that a cow has the colour (or other sensory quality) of milk. As expected, examples (6) are perfect as far as *laiteux* qualifies a physical property of the mushroom, namely its colour.

In their paper, Corbin and Corbin stressed the fact that derived adjectives in *-EUX* pattern like qualifying adjectives, while derived adjectives in *-IER* pattern like relational adjectives. In support of this fact, they give examples (9), which minimally contrast with (6).

- | | | | |
|-----|---|-------------------------------------|--------------------------|
| (9) | a | * <i>Ce champignon est laitier.</i> | ‘This mushroom is dairy’ |
|-----|---|-------------------------------------|--------------------------|

- b **C'est un champignon très laitier.* 'It's a very dairy mushroom'
 c **Un champignon parfumé et laitier* 'A perfumed and dairy mushroom'

They account for the ungrammaticality of (9) by saying that adjectives suffixed by *-IER* are relational adjectives and as such cannot occur in constructions typical of qualifying adjectives. On their view, the relational character of the former stems from their semantics, since it simply requires a contextually specified relationship between the BseN and the HdN's referent. Although Corbin & Corbin's account is on the right track, it cannot be easily extended to the derived adjectives in *-EUX* whose BseN lacks a concrete referent. These adjectives are very numerous. Some of them are given in (10):

- (10) *dangereux* *peureux* *glorieux* *merveilleux* *vertigineux* *scandaleux*
 'dangerous' 'fearful' 'glorious' 'marvelous' 'vertiginous' 'scandalous'

These adjectives will be discussed in section 7.

3. Semantic typing and relational adjectives Semantically, prototypical qualifying adjectives are analysed as intersective because in structure (11a), they entail (11c) as well as (11b), as illustrated in (12) :

- (11) a NP is a A N
 b \models NP is a N
 c \models NP is A
- (12) a Jane is a slender woman.
 b \models Jane is a woman.
 c \models Jane is slender.

As far as qualifying adjectives denote a property of individual, the semantic translation of the predicate NP in structure (11) is (13a), and the semantic type of the adjective is (13b).¹

- (13) a $T(\text{slender woman}) = (\lambda x. \text{slender}(x) \wedge \text{woman}(x))$
 b Type **slender** : $\langle e, t \rangle$ (e = entity, t = truth value)

Adjectives such as *great*, *perfect*, *recent*, *skillful* and so on do not behave like prototypical intersective adjectives, since they do not entail (11c), as (14) shows. These adjectives are called subsective because what the whole NP denotes is included in the denotation of the N they modify, as shown in (15)(Partee 2003).

- (14) a Bill is a skillful sailor.
 b \models Bill is a sailor.
 c $\not\models$ Bill is skillful.
- (15) $[[A\ N]] \subseteq [[N]]$ $[[\text{skillful sailor}]] \subseteq [[\text{sailor}]]$

¹ Application is written $M(N)$, as in logical notation, which indicates that function M applies to N . However, lambda terms are written between brackets e.g. $(\lambda x. M)$. Brackets are left associating for application e.g. (i) $(M(N))(O)$ and right associating for abstraction e.g. (ii) $(\lambda y. (\lambda x. (N(x,y))))$. Whenever there is no ambiguity, (i) have been replaced by $M(N)(O)$ and (ii) by $(\lambda y. \lambda x. N(x,y))$.

(Montague 1970) and others analysed subsecutive adjectives as predicate modifiers, that is as properties of properties rather than properties of individual as is the case for intersective adjectives. Several representations have been proposed to capture this analysis, but the commonest one is given in (16) :

- (16) a $T(\text{skillful sailor}) = (\lambda x. \text{skillful}(\text{sailor}(x)))$
b Type **skillful** : $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$ (intensional version $\langle s, \langle \langle e, t \rangle, \langle e, t \rangle \rangle \rangle$)

When relational adjectives occur in structure (11), they generally do not entail (11c), as (17) shows (actually (17c) sounds ungrammatical). For this reason, they have been considered as subsecutive and have been given a representation on the model of (16).

- (17) a Eric est conseiller naval. 'Eric is a naval advisor'
b \models Eric est conseiller. 'Eric is an advisor'
c $\not\models$ Eric est naval. 'Eric is naval'

However, this analysis has been criticised, both on empirical and methodological grounds. (McNally & Boleda 2004) convincingly argue from distribution that the so-called relational adjectives pattern like prototypical qualifying adjectives rather than like true predicate modifiers. They put to the fore the fact that relational adjectives may occur in predicative structure (cf. (18)), or with a degree adverbial (cf. (19)), or else in a NP lacking an overt N (cf. (20)) :

- (18) a *Depuis dix ans, la production est de moins en moins laitière.* Fr.
'For ten years, the production has been less and less dairy'
b *Aquest congrés és internacional.* Cat.
'This conference is international'
- (19) *La Corniche Cantabrique, la région la plus laitière d'Espagne* Fr.
'The Cantabrian Range, the most dairy area in Spain'
- (20) a *Les pulmonars són les pitjors.* Cat.
'The pulmonary [diseases] are the worst'

Another empirical argument is that relational adjectives usually cannot appear prenominally (cf. (21)), while this position is the only one available to adjectives which are true predicate modifiers, namely plain non subsecutive adjectives such as *alleged*, *arguable*, *putative*, etc. (cf. (22), (23)).

- (21) a **una pulmonar malatia* Cat.
'a pulmonary disease'
b **une présidentielle élection* Fr.
- (22) a *un presumpte assassí* Cat.
b *un soi-disant assassin* Fr.
'an alleged murderer'
- (23) a **un assassí presumpte* Cat.
b **un assassin soi-disant* Fr.

At a methodological level, there is a general trend in formal semantics to reanalyse as intersective most adjectives that had been treated as predicate modifiers in former accounts ((Partee 2003; Larson 1998) and references quoted therein). This move allows a much simpler description of the data and reduces the number of adjectival classes. From this perspective, (McNally & Boleda 2004 : 188) propose first, that relational adjectives denote properties of kinds. That is, they belong to the same sortal class as adjectives such as *widespread* or *extinct* in English. Thus, according to them, the semantic translation of a relational adjective such as *naval* ‘naval’ is (24), where ‘ x_k ’ is a variable of type $\langle e, t \rangle$ denoting a kind :

$$(24) \quad T(\text{NAVAL}) = (\lambda x_k. \mathbf{naval}(x_k))$$

Type of x_k : $\langle e, t \rangle$

Second, they posit that all common nouns have an implicit kind argument, which is related to an individual-sort argument typically associated with nouns through the Carlsonian realisation relation R . Thus, the translation for *conseiller* ‘advisor’ is (25), where the subscript o indicates an individual-level entity.

$$(25) \quad T(\text{ADVISOR}) = (\lambda x_k. \lambda y_o. R(y_o, x_k) \wedge \mathbf{advisor}(x_k))$$

They suppose that a **N AP** constituent translates as (26a). Hence, the noun phrase *conseiller naval* will translate as (26b), which ultimately gives (26c) after the kind argument has been saturated by a contextually determined kind, namely the indexed free variable (k_j) :

$$(26) \quad \begin{array}{ll} \text{a} & T([\text{N AP}]) = (\lambda x_k. \lambda y_o. R(y_o, x_k) \wedge \mathbf{N}(x_k) \wedge \mathbf{A}(x_k)) \\ \text{b} & (\lambda x_k. \lambda y_o. R(y_o, x_k) \wedge \mathbf{advisor}(x_k) \wedge \mathbf{naval}(x_k)) \\ \text{c} & (\lambda y_o. R(y_o, k_j) \wedge \mathbf{advisor}(k_j) \wedge \mathbf{naval}(k_j)) \end{array}$$

When the property of individual *conseiller naval* is applied to an argument such as *Eric*, which happens in sentence (27a), the resulting representation is (27b) :

$$(27) \quad \begin{array}{ll} \text{a} & \textit{Eric est conseiller naval.} \quad \quad \quad (= (17a)) \\ & \text{‘Eric is (a) naval advisor’} \\ \text{b} & R(\mathbf{Eric}, k_j) \wedge \mathbf{advisor}(k_j) \wedge \mathbf{naval}(k_j) \end{array}$$

The advantage of this analysis is twofold. First, it does not directly ascribe the predicate **naval** to Eric, while still entailing that a naval advisor is an advisor. Second, it predicts the ungrammaticality of (17c) *#Eric est naval*. The latter results from a type clash : since the argument of the adjective denotes an individual, instead of a kind, the adjective cannot be predicatively used.

As for the issues raised in the preceeding section, McNally and Boleda explicitly take it for granted that adjectives suffixed by *-EUX* are plain qualifying adjectives (McNally & Boleda 2004 : 183). Consequently, the latter are intersective and take an individual-level argument (x_o), while ordinary relational adjectives take a kind-level argument (x_k). This difference in typing is supposed to account for most of the distributional properties of *-EUX* adjectives and notably for the grammaticality of (28) as opposed to the ungrammaticality of (17c) *#Eric est naval*.

- (28) *Eric est peureux.*
 ‘Eric is fearful’

(individual reading)

McNally and Boleda’s article leaves aside the deeper question of why denominal adjectives suffixed by *-EUX* behave differently from other denominal adjectives, namely ordinary relational adjectives. This question is my main concern in the present paper. Moreover, according to McNally & Boleda’s analysis qualifying adjectives are not expected to behave like relational adjectives. However, this happens with adjectives suffixed by *-EUX* as we shall see in the next section (examples (31)-(32)). This could be a potential problem for their analysis. Anyway, insofar as their goal is orthogonal to the one I aim for here, I consider our works as complementary each to the other.

4. Heuristic distinctions

4.1. Additional data

A distinctive property of relational adjectives is their argument-saturating capacity: their base noun can be interpreted as an argument of (a predicate implied by) the NP’s head. Hence the oft-noticed equivalence between the adjective and the PP in (29) (Bartning 1980; Wandruszka 2004). However, derived adjectives in *-EUX* do not share this property as data (30) show.

- | | | | |
|------|---|--|-------------------------|
| (29) | a | <i>Le voyage (du président + présidentiel)</i> | ‘the president’s trip’ |
| | b | <i>La production (du coton + cotonnière)</i> | ‘the cotton production’ |
| (30) | a | <i>La vente (du lait + *laiteuse)</i> | ‘the selling of milk’ |
| | b | <i>La production (du coton + *cotonneuse)</i> | ‘the cotton production’ |

The above contrast is so clear-cut that it seems that everything that furthers the appearance of a relational adjective in these sentences, as a result prevents the occurrence of the corresponding adjective in *-EUX*.

Quite unexpectedly, the adjective’s base noun can also function as an argument of the predicate subjacent to or implied by the head noun, as illustrated in (31). In this case, the derived adjective behaves like a relational adjective, as the unacceptability of (32) attests.

- | | | |
|------|--|---|
| (31) | <i>fermentation (vineuse + du vin)</i> | ‘vine fermentation’ |
| | <i>averse (neigeuse + de neige)</i> | ‘snowfall’ (<i>averse</i> ‘shower, Xfall’) |
| (32) | <i>*la fermentation est très vineuse</i> | ‘the fermentation is very viny’ |
| | <i>*une averse très neigeuse</i> | ‘a very snowy shower’ |

The capacity of adjectives suffixed by *-EUX* to switch from one behaviour to another constitutes the third puzzle we have to solve. Insofar as this puzzle only exists with data (29)-(30) in the background, I shall first deal with the latter. The next section proposes a general hypothesis with this end in view.

McNally and Boleda content that relational adjectives have no argument saturating capacity by themselves, and their analysis forces them to treat this property as a byproduct. They rely on (Mezhevich 2004), who defends the idea according to which the saturation in question is nothing but a contextual effect. The data mentioned in this section challenge this view. They lead us to consider seriously the idea according to which the semantic import of the BseN could have a bearing on the relationship that can be established between the latter and the HdN.

4.2. Working hypothesis

As a first step toward an explanation of contrast (29)-(30), I will assume (33) as a working hypothesis:

(33) NATURE OF THE SEMANTIC RELATIONSHIP

In a NP with a denominal adjective, the link between the adjective's BseN and the HdN can be either external or internal.

Prototypical external links are mainly established through human-centered predicates (*prédicats anthropocentrés*), to adopt the terminology of (Cadiot & Nemo 1997), which say what the head noun's referent does or what people do with it. These predicates are essentially verbs, as far as verbs tend to "reflect segments of causal structure" (Croft 1991: 161) and as human being are participants who can initiate causal chainings. What this means is that verbs instantiate a relationship between participants —the arguments— that is spatio-temporally anchored and that has no other foundation than the scenario the verb describes. The more the scenario expresses a causal chaining, the more argument-like participants are. In a complementary way, an internal link is a relationship which exists in virtue of the properties of the nouns' referents themselves, that is independently of any scenario or story that could be devised. The predicates that found this link are not human-centered but object-centered (Cadiot & Nemo speak of *sémantique intrinsèque*). It is so when one of the properties characteristically associated with the referent of the BseN is expressed as pertaining to the referent of the HdN by the mere existence of the latter. Notice that this property may be contingent, provided it is given as resulting from the very existence of the BseN's referent.

In what follows, I will try to sustain the hypothesis according to which the relationship is internal if the A is suffixed by *-EUX* and external or internal otherwise.

5. Plain denominal adjectives

5.1. The semantics of relational adjectives

Saying that the relation is external in NP containing a so-called relational adjective simply amounts to saying that the BseN is bound to be an argument in the relation associated to the head noun. The elusive character of the relation and its great variability have repeatedly been stressed in the literature (Bartning 1980; Valetopoulos 2005). (Mezhevich 2004: 96) uses these features as an argument to claim first, that the relation in question is not part of the lexical meaning of either the head noun or the adjective. Second, that "the relation expressed by the construction depends on the meaning of the modified noun". And third, that the relation seems arbitrary and potentially unlimited. Although I totally agree with Mezhevich's second claim, I will briefly comment on her first and third claim.

Even though context may supply the relation, I claim that the meaning of the head noun, and in some cases of the base noun, does provide the semantic information the relation is based upon. Generally, this information is overabundant because it offers many possible relations, whereas we need only one. But it can also be very limited and give us only a clue about the relationship that is required. In both cases, it is only then that a selection process takes place, which resorts to encyclopaedic and extra-grammatical knowledge, as most inferential processes in language do.

If we look at the data, we see that the BseN functions all the more as an argument as the interpretation of the head noun involves a scenario encoded in an argument structure. Such is the case when the head noun is morphologically linked to a verb, as in

(29) above, repeated under (34).² When there is no morphologically linked verb, the scenario may be supplied by the semantics of the head noun. In (35), it is the telic information tied to the fact that the N's referent is a functional artefact (Pustejovsky 1995); in (36), the scenario is somehow recoverable from the function assigned to troops; in (37)-(38), no scenario with causal chaining is recoverable from the HdN's semantics. Other interpretational schemes apply, which give rise to a spatial relation in (37), whereby the BseN stands for the Ground and the HdN for the Figure, and to an equivalence relation in (38). These various types of relations are shown in table 1.

(34)	a	<i>voyage présidentiel</i>	‘president’s trip’
	b	<i>production cotonnière</i>	‘cotton production’
(35)	a	<i>palais épiscopal</i>	‘episcopal palace’
	b	<i>centrale électrique</i>	‘power station’
(36)		<i>troupes frontalières</i>	‘troops (stationed at + defending) the borders’
(37)		<i>carte murale</i>	‘wall map’
(38)	a	<i>cellule familiale</i>	‘family cell’
	b	<i>globe oculaire</i>	‘eyeball’

Active N	Semantics	Interpretation of the NP	
VOYAGE	$(\lambda x. \lambda e. \mathbf{travel}(e, x))$	$(\lambda e. \mathbf{travel}(e, x) \wedge \mathbf{president}(x))$	(a)
PALAIS	$(\lambda x. \lambda z. \mathbf{live-in}(e, x, \mathbf{in}(z)))$	$(\lambda z. \mathbf{live-in}(e, x, \mathbf{in}(z)) \wedge \mathbf{bishop}(x))$	(b)
TROUPE	$(\lambda y. \lambda x. \mathbf{defend}(e, x, y))$	$(\lambda x. \mathbf{defend}(e, x, y) \wedge \mathbf{border}(y))$	(c)
MUR	$(\lambda N. \lambda x. \exists y. \text{LOC}(x, \mathbf{on}(y)) \wedge \mathbf{N}(x) \wedge \mathbf{wall}(y))$	$(\lambda x. \exists y. \text{LOC}(x, \mathbf{on}(y)) \wedge \mathbf{map}(x) \wedge \mathbf{wall}(y))$	(d)
CELLULE	$(\lambda y. \lambda x. \text{ISA}(x, y) \wedge \mathbf{cell}(y))$	$(\lambda x. \text{ISA}(x, y) \wedge \mathbf{cell}(y) \wedge \mathbf{family}(x))$	(e)

Table 1. Semantic relations and relational adjectives

As table 1 makes clear, only a part of the relations involved in relational adjectives exhibit a scenario with causal chaining.

As for the claim according to which the range of interpretations in NPs with relational adjectives is unlimited, it is often backed by the comparison between these NPs and **N1N2** compounds in English (cf. (39)) and other Germanic languages. Their functional similarity is a recurrent theme in the literature (Wandruszka 2004), which also stresses the very large number of possible relations (Downing 1977).

(39)	honey bee	picture book	meat ball	wish bone
	bell tower	towel rack	mouth organ	bird dog

Actually, the fact that there is probably no limit to the types of relations that may be established in compounds such as (39), as well as in NPs with a relational adjective, is not problematic so long as these interpretations are easily recoverable. They are all the more so as each interpretation is weakly dependent of the context. This happens when

² The fact that a scenario could be recoverable via the semantics of the head noun does not entail that the NP denotes an event, as the contrast between (34a) and (35a) shows.

the semantic information, both lexical and encyclopedic, provided by the constituents of the expression is sufficient to elaborate a plausible interpretation. I suggest that this is the case in (39) except for the rightmost column. In the latter case, even with a strong pragmatic and background information, it seems difficult to infer what the meaning of the compound is. Similar situations occur when the compound belongs to a restricted sociolect, tied to specific human activities (hunting, sailing, etc.), or else when it is coined on the spot and then happens to encode a very specific relationship between the Ns' referents. Often enough, the original motivation for the denomination get lost and we are left with an opaque expression. But if we leave aside these cases, the overwhelming majority of the expressions in question has an interpretation which follows regular and general patterns, some of which were illustrated in table 1.³

5.2. The interpretation of NPs with relational adjectives

How do we get the interpretation of NPs including a relational adjective from the interpretation of its parts ? I will assume the following : (i) the semantics of the relational A is identical to the semantics of the base noun (cf. (41a)); (ii) the adjective is marked with the feature 'DEN1' (denominal adjective, type1) by the morphological rule which derives the adjective in question ; (iii) the interpretation of the adjective takes place at the level of the NP, on the model of what takes place with the interpretation of NPs with genitive (cf. (40) ; cf. also (Partee & Borschev 2003) and references therein) ; (iv) rule (40) is triggered when the head of the NPDA denotes an event.

For instance, if $T(\textit{présidentiel}) = (41a)$, $T(\textit{élection}) = (41b)$, then $T(\textit{élection présidentielle}) = (41c)$. Beta-reduction yields the final result (41d), before existential closure applies.

$$(40) \quad T(N A_{\text{DEN1}}) = (\lambda N. \lambda A. \lambda e. \lambda x/y. N(e, x, y) \wedge A(x/y))^4$$

- (41) a $T(\textit{PRESIDENTIEL}) = \textbf{president}$
b $T(\textit{ELECTION}) = (\lambda y. \lambda x. \lambda e. \textbf{elect}(e, x, y))$
c $T(\textit{ELECTION PRESIDENTIELLE}) = (\lambda N. \lambda A. \lambda e. \lambda x. N(e, x, y) \wedge A(y))$
 $\quad (\textbf{president})(\lambda y. \lambda x. \lambda e. \textbf{elect}(e, x, y))$
d $(\lambda e. \lambda x. \textbf{elect}(e, x, y) \wedge \textbf{president}(y))$

6. Adjectives suffixed by -EUX

6.1. Classifying adjectives suffixed by -EUX

If we look into the semantics of -EUX adjectives, we see that their meaning varies in function of the semantic type of their base N and head N. Heuristically, I have distinguished two blocks in function of the nature of the relation involved (cf. (42)). The first block includes -EUX adjectives whose base N denotes a concrete entity (object vs substance). The second one, includes adjectives whose base N denotes an abstract entity, either intensive or extensive. An entity is intensive when it has no temporal or spatial extension or does not exist by itself but only in relation to an experience of a

³ The situation parallels the discussion of conversion by (Clark & Clark 1979), who were bewildered by the number of interpretative patterns conversion could exhibit, and the answer by (Aronoff 1980), who convincingly argued that these patterns were few and showed that the actual interpretation resulted of pragmatic adjustments.

⁴ The notation « x/u » is intended to leave open the possibility that the adjective might modify any of the head noun's arguments.

subject. When an entity has a spatio-temporal extension, it is said to be extensive (Flaux & Van De Velde 2000).

- (42) (I) BseN = extensive N. Denotatum : Concrete object (*poissonneux* < *poisson* ‘fish’), substance (*neigeux* < *neige* ‘snow’).
 (II) BseN = intensive N. Denotatum : behaviour (*courageux* < *courage* ‘courage’), affects (*joyeux* < *joie* ‘joy’),
 BseN = extensive-abstract N. Denotatum : state (*dangereux* < *danger* ‘danger’).

In each block, we will distinguish several groups in function of the semantic import of the BseN.

Group 1. According to (Corbin & Corbin 1991), when the base N denotes a concrete object or substance, the adjective transfers properties that must be sensorially perceived from the base noun to the NP’s head noun. This group behaves like ordinary qualifying adjectives such as *heavy*, *blue* and so on. (Kamp 1975) argues that these adjectives express a property concerning a particular dimension of the head noun’s referent, for instance, weigh for *heavy*, colour for *blue*, etc. In a parallel way, the dimensions at stake for the derived adjectives in *-EUX* are those mentioned in table 2.⁵

Examples	Dimension
<i>farineux</i> ‘floury’, <i>culaireux</i> ‘ashy’	ASPECT
<i>crayeux</i> ‘chalky’, <i>cireux</i> ‘waxen’	COLOUR
<i>gazeux</i> ‘gaseous’, <i>terreux</i> ‘earthy’	CONSISTENCY
<i>grumeleux</i> ‘lumpy’, <i>floconneux</i> ‘fluffy, frothy’	CONSTITUENCY
<i>bulbeux</i> ‘bulb-shaped’	FORM
<i>anguleux</i> ‘angular, bony’, <i>globuleux</i> ‘protruding’	SHAPE
<i>aqueux</i> ‘watery’	TASTE

Table 2. Varieties of dimensions for *-EUX* adjectives

By convention, formula (43a) will represent the various relationships at stake here. If variable *y* corresponds to the base noun *cire* ‘wax’, the formula reads as (43b).

- (43) a EQ(x,y,DIMS) EQ = equivalent, DIMS = dimension
 b EQ(x,y,COLOUR) & **wax**(y) ‘x is equivalent to wax for the colour’

Group 2. A second group of adjectives suffixed by *-EUX* seems to involve a spatial relationship. The referent of the head noun corresponds to the Ground and that of the base noun corresponds to the Figure, on the model of (44) (Talmy 1978; Langacker 2000). The localiser of the locative relation, to use a term introduced by (Kracht 2002), can have the semantics of IN(SIDE) (cf. (45a)) or that of ON (cf. (45b)).

- (44) *ciel nuageux* ‘cloudy sky’ = ‘clouds (Figure) [are] in [the] sky (Ground)’

- (45) a (*sol+prairie+eau*) *argileux/euse* ‘clayey soil, meadow, water’
 (*lac + mer+ rivière*) *poissonneux/euse* ‘lake, sea, river full of fish’
eau gazeuse ‘sparkling water’, *lait crémeux* ‘creamy milk’
viande filandreuse ‘stringy meat’, *forêt ombreuse* ‘shady forest’
 b (*talus+futaie*) *broussailleux/euse* ‘bushy embankment, forest’

⁵ The one and same adjective can involve several dimensions e.g. for *farineux* ASPECT, COLOUR.

étagère poussiéreuse ‘dusty shelf’, *tronc épineux* ‘thorny trunk’

I will represent the spatial relationship expressed in these expressions by means of formula (46). If *y* corresponds to the base noun *argile* ‘clay’, the formula reads as (46b).

- (46) a LOC(y, **P**(x)) LOC = localisation, **P** = spatial prep.
 b LOC(y, **in**(x)) \wedge **clay**(y) ‘clay is localised in x’

It should be kept in mind, however, that the relationship under discussion is not purely spatial insofar as it serves above all to express the fact that the head N's referent has a characteristic property tied to the presence of the base N's referent within it.

Group 3. The majority of adjectives of the third group do not end in *-EUX*. Most of them are based on (e.g. *courageux*) or correlated to (e.g. *intelligent*) intensive nouns, that is nouns the referent of which is intensive. These adjectives have many more syntactic structures than the preceeding ones as (48) and table 3 shows. I will restrict myself to considering structures (a-d) of table 3.⁶

The first subgroup is formed by the agent-oriented adjectives a sample of which is given in (47). These adjectives qualify the behaviour or the acts of an agent relatively to a social norm.

- (47) *intelligent*, *adroit* ‘skilful’, *gauche* ‘awkward’, *stupide* ‘stupid’, *habile* ‘clever, deft’, *hardi* ‘bold’, *honnête* ‘honest’
astucieux ‘shrewd’, *courageux* ‘brave’, *ingénieux* ‘ingenious’

	Structure	<i>stupide</i>	<i>intelligent</i>	<i>courageux</i>	<i>honteux</i>	<i>amoureux</i>	<i>dangereux</i>
a.	Num est A	+	+	+	+	+	+
b.	Nint est A	+	+	+	+	−	+
c.	Nint A	+	+	+	+	−	+
d.	un Num A	+	+	+	+	+	+
e.	N ₀ est A de Num ₁	−	−	−	−	+	−
f.	[Vinf] est A	+	+	+	+	−	+
g.	il est A de Vinf	+	+	+	+	−	+
h.	il est A de Vinf de la part de N ₀	+	+	+	+	−	−
i.	Num est A de Vinf	+	−	+	+	−	−

Table 3. Syntactic structures of group 3 adjectives

- | | | | |
|------|---|---|--------------------------------|
| (48) | a | <i>Paul est stupide.</i> | ‘Paul is stupid’ |
| | b | <i>L’intervention de Paul est stupide.</i> | ‘P’s intervention is stupid’ |
| | c | <i>une intervention stupide</i> | ‘a stupid intervention’ |
| | d | <i>un guide stupide</i> | ‘a stupid guide’ |
| | e | <i>*Paul est stupide (du travail + de Lise)</i> | ‘Paul is stupid of work, Lisa’ |
| | f | <i>de partir est stupide</i> | ‘to leave is stupid’ |
| | g | <i>il est stupide de partir</i> | ‘it is stupid to leave’ |

⁶ How morphology can handle the range of constructions each derived adjective shows ? This issue is rarely addressed in morphological works, if at all.

- | | | | |
|------|---|--|--------------------------------|
| | h | <i>il est stupide de partir de la part de Paul</i> | ‘it is stupid to leave from P’ |
| | i | <i>Paul est stupide de partir.</i> | ‘Paul is stupid to leave’ |
| (49) | a | <i>Le départ de Paul est courageux.</i> | ‘P. departure is courageous’ |
| | b | <i>Paul est courageux de partir.</i> | ‘Paul is courageous to leave’ |
| | c | <i>Paul est courageux.</i> | ‘Paul is courageous’ |

Sentences (49a-b) both mean something like (50). I would suggest that sentence (49c) is a generalisation of this statement and has interpretation (50b).

- | | | |
|------|---|--|
| (50) | a | ‘from the point of view of the speaker Paul’s act of leaving is an instance of courage’ |
| | b | ‘from the point of view of the speaker all of Paul’s acts (relevant to such and such domain) are instances of courage’ |

A tentative representation of interpretation (50a) is given under (51a), which has to be read as ‘x is an instance of courage’, if y corresponds to the BseN *courage*.

- | | | | |
|------|---|---|-------------------------------|
| (51) | a | instance (x,y) | |
| | b | instance (x,y) \wedge courage (y) | ‘x is an instance of courage’ |

Adjectives of emotion constitute the second subgroup. Traditionally, people distinguish three subsets within them (cf. (Bouillon 1997) and works cited therein). In the first one, the head noun’s referent feels the emotion (cf. (52a)) ; in the second one, the head noun’s referent causes somebody else to feel the emotion (cf. (52b)) and in the third one both situations are possible.⁷ The first two interpretations are illustrated in (53) :

- | | | |
|------|---|---|
| (52) | a | <i>joyeux</i> ‘joyful’, <i>heureux</i> ‘happy’, <i>peureux</i> ‘fearful’, <i>haineux</i> ‘full of hatred’, (<i>anxieux</i> ‘anxious’, <i>arrogant</i> ‘arrogant’, etc.). |
| | b | <i>ennuyeux</i> ‘annoying’, (<i>terrifiant</i> ‘terrifying’, <i>accablant</i> ‘exhaustive, oppressive’, etc.) |
| | c | <i>honteux</i> ‘shameful’ |
-
- | | | | |
|------|---|--------------------------|---|
| (53) | a | <i>attente peureuse</i> | ‘expectation which expresses fear’ |
| | b | <i>lecture ennuyeuse</i> | ‘reading which gives rise to annoyance’ |

A way to represent the relation between the BseN and the HdN is proposed in (54a). In all these cases, a causal relation comes out, in which the HdN’s referent is the causator. If y corresponds to the BseN *ennui* ‘boredom’, the relation has the reading (54b).

- | | | | |
|------|---|--|--------------------------------|
| (54) | a | cause (x, exist (y)) | |
| | b | cause (x, exist (y)) \wedge boredom (y) | ‘x causes boredom to come out’ |

The third and last subgroup we will be concerned with, is the group of adjectives formed upon a N denoting a spatio-temporally anchored situation, such as *désastre* ‘disaster’, *danger* ‘danger’, etc., as illustrated in (55). These intrinsically express the evaluation of an event or an object from the part of the speaker.

⁷ The causation reading we find in (52b) is actually more widespread. It appears with adjectives that are not emotional —e.g. *avalancheux* ‘avalanche-prone’— and, quite regularly, when the HdN denotes an illness e.g. *fièvre aphteuse* ‘foot and mouth disease’ lit. ‘aphta fever’.

- (55) *aventureux* ‘adventurous’, *désastreux* ‘disastrous’, *dangereux* ‘dangerous’,
périlleux ‘perilous’, *scandaleux* ‘scandalous’, *hasardeux* ‘hazardous, risky’

With structure (T3-b), (T3-c), the interpretation uniformly is that the referent of the head noun is seen as an instance of the state denoted by the base noun. Examples (56) illustrate this point.

- (56) *une guerre désastreuse* ‘a war the property of which is to be an
instantiation of what a disaster is’
cette guerre est désastreuse ‘this war is an instantiation of what a
disaster is’

When the A occurs in structures (T3a-d), as in (57), I suggest that the interpretation is also based on the type / token correlation, the only difference being that we have a set of tokens instead of just one cf. (58). These tokens could be events crucially involving the bridge, for instance events tied to the function of the bridge, like riding across the bridge, etc.

- (57) *ce (pont + voisin) est dangereux.* ‘this (bridge + neighbour) is dangerous’
un (pont + voisin) dangereux ‘a dangerous (neighbour + bridge)’

- (58) ‘the events in which this (neighbour + bridge) is crucially involved are
instanciations of what a danger is’

Since the interpretation involves the type / token correlation, the representation given in (51) will be suited for this subgroup also.

6.2. Conditions on the internal relation

The derivational rule forming the suffixed adjectives in *-EUX* puts constraints on the relationship that must be established between the BseN and the HdN. The first of these constraints states that this relationship must be internal and is given the tentative formulation C1. This constraint implies the negation of the dual constraint C2, which holds for most other denominal adjectives. Constraint C2 is normally satisfied whenever the HdN involves an event (cf. T1-a-c).

CONSTRAINT C1. The semantic link between the BseN and the HdN involves a property characteristic of one of the referents (it is a referent-centered property). Two subcases have to be distinguished :

- (i) the property in question is an inherent property of the BseN’s referent (cf. *laiteux* for the dimension COLOUR; cf. also §7.2).
- (ii) the property in question is a property of the HdN’s referent and is based on the fact that the BseN’s referent significantly modifies the nature of the HdN’s referent (e.g. *poissonneux*, *dangereux*).

CONSTRAINT C2. The semantic link between the BseN and the HdN involves a causal chaining, that is a relation which requires the categorisation of arguments as Agent/Instrument or Patient to be properly understood.

By ‘significantly modifies’, I mean that people are not supposed to behave in the same way towards what the NPDA denotes (e.g. *un pont dangereux* ‘a dangerous bridge’) as towards what the basic NP denotes (e.g. *un pont* ‘a bridge’). ‘Causal chaining’ refers to (Croft 1991, 2001) and Agent and Patient are defined as in (Dowty 1991; Van Valin & Lapolla 1997) among others.

The fact that suffixed adjectives in *-EUX* imply the negation of C2 readily accounts for the ungrammaticality of examples (30), since this prevents the base nouns *lait* and *coton* to be arguments in the argument structure provided by *vente* and *production* respectively. They cannot be participants in the scenario introduced by the HdN, contrary to what the latter requires.

The internal nature of the link between the two Ns is corroborated by the fact that we cannot question this relation with a verb of doing, that is a verb involving a causal chaining. For instance, while dialogue (59) is perfect, (60) is utterly bad.

- (59) a *Que fait une vache laitière ? — Elle produit du lait.*
 ‘What does a milk cow do ? — It products milk’
 b *Que fait une usine papetière ? — Elle fabrique du papier.*
 ‘What does a paper mill do ? — It makes paper.
- (60) a **Que fait un sol argileux ? — Il contient de l’argile.*
 ‘What does a cloudy sky do ? — It contains clouds’
 b **Que fait un garçon honteux ? — Il éprouve de la honte.*
 ‘What does a shameful boy do ? — He feels shame’

The third constraint concerns only the adjectives whose BseN denotes a concrete referent.

CONSTRAINT C3. The relationship between the HdN’s referent and the BseN’s referent must have a natural origin : it must not result from a human intervention.

Constraint C3 accounts for the contrast between (61) and (62). The presence of fish in lakes or seas results from a natural process. Hence the grammaticality of (61). On the contrary, if fish is displayed on stalls or happens to be within nets, it is through the intervention of human beings. Hence the ungrammaticality of (62).⁸

- | | | |
|------|--------------------------------|----------------------------|
| (61) | <i>lac poissonneux</i> | ‘lake full of fish’ |
| | <i>mer poissonneuse</i> | ‘sea full of fish’ |
| (62) | <i>*étal poissonneux</i> | ‘stall with fish’ |
| | <i>*épuisette poissonneuse</i> | ‘landing net full of fish’ |

Notice that the only way to express the content aimed at in (62) is to use a PP with *de* as in (63). This possibility is unsuited in the case of (61), as shown in (64). In (64b) *mer* has a metaphorical meaning, which also comes out in (64c) :

- | | | |
|------|------------------------------|-------------------------|
| (63) | <i>étal de poissons</i> | ‘stall of fish’ |
| | <i>épuisette de poissons</i> | ‘landing net with fish’ |

⁸ Talking about a pond (*étang*) stocked with fish you can still use in French *étang poissonneux*. What counts is the actual relationship between the fish and the pond, not the circumstances that yielded the situation in question. In the case at stake, the relationship is a natural one, unlike that involved in (62).

- | | | | |
|------|---|---------------------------|--------------------|
| (64) | a | *? <i>lac de poissons</i> | ‘lake of fish’ |
| | b | # <i>mer de poissons</i> | ‘sea of fish’ |
| | c | <i>mer de parapluies</i> | ‘sea of umbrellas’ |

In the same vein, constraint C3 explains why (65a) is out while (65b) is sound.

- | | | |
|------|---|---|
| (65) | a | * <i>Le jardin caillouteux du temple Daito ku-ji</i> |
| | b | <i>Le jardin de cailloux du temple Daito ku-ji</i>
‘The pebble garden of temple Daito ku-ji’ |

Since zen gardens are artefacts, (65a) constitutes an inappropriate designation of the garden in question. (65b) is the only possible denomination.

Parallel facts can be observed with the ‘constituency’ reading of the adjectives suffixed by *-EUX*. If you want to say that a jumper is made of wool, you have to use a PP with *en* or *de*, as in (66a), since it is the normal way to express the complement of matter in French. Constraint 3 makes (66b) ungrammatical, insofar as a jumper is an artefact. The opposite grammaticality judgements are observed in (67) because the head noun denotes a natural species.

- | | | | |
|------|---|-------------------------------------|----------------------------|
| (66) | a | <i>chandail (en + de) laine</i> | ‘(thick) woolen jumper’ |
| | b | * <i>chandail laineux</i> | ‘(thick) wooly jumper’ |
| (67) | a | * <i>rhinocéros (en + de) laine</i> | ‘woolen rhinoceros’ |
| | b | <i>rhinocéros laineux</i> | ‘rhinoceros with fur’ |
| | | <i>des moutons bien laineux</i> | ‘sheep with a lot of wool’ |

All these facts show how the adjectives suffixed by *-EUX* are sensitive to the naturalness of the relationship between the HdN and the BseN. This in turn supports the view that the relationship in question is an internal one.⁹

7. Partial account

7.1. The normal cases

In this section, I will sketch a very tentative treatment of the semantic behaviour of adjectives suffixed by *-EUX*. The mechanism I propose is modelled on the general treatment already proposed for denominal adjectives in (40)-(41). This view is supported by the fact that the adjectives suffixed by *-EUX*, in some cases that must be explicited, behave in the same way as other denominal adjectives. Examples (31)-(32) illustrated this point. Examples (68a)-(69a) have been added to this set and will be commented below :

- | | | |
|------|---|---------------------------------|
| (31) | <i>fermentation (vineuse + du vin)</i> | ‘vine fermentation’ |
| | <i>averse (neigeuse + de neige)</i> | ‘snowfall’ |
| (32) | * <i>la fermentation est très vineuse</i> | ‘the fermentation is very viny’ |
| | * <i>une averse très neigeuse</i> | ‘a very snowy shower’ |

⁹ A more thorough study of the suffixation by *-EUX* would require examining at least two other denominal suffixations, namely the one by *-E* (*étoilé* ‘starred’ < *étoile* ‘star’) and the one by *-U* (*joufflu* ‘chubby-cheeked’ < *joue* ‘cheek’).

- (68) a *piqure intraveineuse* ‘intravenous injection’
b *expédition intergalactique* ‘intergalactical expedition’
c *gazoduc transsibérien* ‘transsiberian gas pipeline’
- (69) a **piqure très intraveineuse* ‘very intravenous injection’
b **expédition très intergalactique* ‘very intergalactical expedition’
c **gazoduc très transsibérien* ‘very transsiberian gas pipeline’

Consequently, the present treatment assumes (i) that the adjective is marked with a feature ‘DEN2’ by the lexeme formation rule that derives the adjective in question ; (ii) that the semantics of the adjective is identical to the semantics of the base noun ; (ii) that the interpretation of the adjective takes place at the level of the NP. But here the mechanism in question departs from the general treatment devised for other denominal adjectives.

I suppose that two rules are at work to provide the meaning of NPs containing suffixed adjectives in *-EUX*. The first one is the general rule (40) repeated here under (70) ; the second one is (71), whose main characteristic is to leave the relation **R** that links the arguments unspecified.

$$(70) \quad T(N A_{DEN1}) = (\lambda N. \lambda A. \lambda e. \lambda x/y. N(e,x,y) \wedge A(x/y)) \quad (= (40))$$

$$(71) \quad T(N A_{DEN2}) = (\lambda N. \lambda A. \lambda y. \lambda x. R(x,y) \wedge N(x/y) \wedge A(x/y))$$

The choice of the rule is triggered by the nature of the HdN. If the head noun denotes an event, (70) will be chosen (the general rule). If it is not the case, rule (71) specific to *-EUX* adjectives will be chosen. Event nominals are defined according to the criteria given by (Kiefer & Gross 1995) and (Kiefer 1998). Before going into the detail of the processing, I will go on exposing the architecture of the treatment.

As for relation **R** introduced in (71), it will be specified in function of the type of the BseN. We can take advantage of the distinctions made in (42) to posit two groups of relations corresponding respectively to the case where the BseN denotes an intensive entity (*courage, joie*) or an abstract extensive entity (*scandale*), and to the case where it denotes a concrete entity (*cire*). The R’s values these cases imply are summed up in tables 3 and 4. They reproduce the representations already proposed in section 6.1.

Trigger : BseN	Example	R’s value	
Intensive N	<i>courage</i>	$(\lambda y. \lambda x. \mathbf{instance}(x,y))$	(a)
Intensive N - affect	<i>joie, peur, ennui</i>	$(\lambda y. \lambda x_k. \mathbf{cause}(x_k, \mathbf{exist}(y)))$	(b)
Abstract N - state	<i>scandale, désastre</i>	$(\lambda y. \lambda x. \mathbf{instance}(x,y))$	(c)

Table 4. R’s values correlated to block (II)

Trigger : BseN	Example	R’s value	
Concrete N	<i>cire, bulbe</i>	$(\lambda y. \lambda x. EQ(x,y,DIMS))$	(a)
Concrete N	<i>poisson, argile</i>	$(\lambda y. \lambda x. LOC(y, \mathbf{P}(x)))$	(b)

Table 5. R’s value correlated to block (I)

My claim is that none of the relations listed as potential values of **R** involves a causal chain in Croft’s sense, let alone the notion of Agent.

The type / token relation at stake in (T4-a) and (T4-c) clearly does not involve any semantic role like Agent or Patient. I refer to (Jackendoff 1983) for a discussion relevant to this point. This relation has to do with categorisation and as such needs no temporal anchoring.¹⁰

The equative relation does not involve the roles Agent or Patient either (Boons, Guillet & Leclère 1976 : 72). Measure verbs support this view, insofar as the fact that they do not passivize (cf. (72)) has often been considered as a consequence of the fact that they embody an equative relation of the type proposed here.¹¹

- (72) Our turkey weighs seven kilograms.
 *Seven kilograms are weighed by our turkey.

Other equative verbs such a *resemble* e.g. *Liz resemble her mother* are also traditionally considered as devoid of semantic roles Agent and Patient.

As for the locative relation introduced in (T5-b), (Dowty 1991) argues against including Figure and Ground into the list of thematic roles. He pleaded that spatial relations should be kept apart from relations involving a causal chaining. In the same vein, (Davis 2001 : 110) discusses verbs such as those in (73), the meaning of which includes no causal chaining at all but a part/whole relation close enough to the relation (T5-b) aims at capturing.

- (73) Bronze contains tin.
 The game includes dice.

The only case left, (T4-b), seems more problematic, since it explicitly mentions a causal relation. However, this relation is both basic and minimal. Basic, in the sense that this interpretation is likely to emerge from a sequence of two events every time one of the events can be seen as the cause of the other.¹² Example (74a) illustrates this case, where *ev*₁ is naturally interpreted as the cause of *ev*₂ (*he* refers to the child).

- (74) a [EV1 The ball hit the child]. [EV2 He began to scream].
 b The child began to scream because the ball hit him.

I assume that this causal reading appears not only in discourse, as in (74a), but also in NPs (*lecture ennuyeuse*) or even lexeme internally as in compounds (Fradin 2005 : §3.3). In discourse, the causal link between the two events can be made explicit by means of the conjunction *because* as in (74b). However, this move is not possible within lexemes insofar as causal relations between events have no morphological exponence. The causal complement introduced by *because* may never be a participant in a scenario described by a lexeme.¹³ In this respect, the causal relation in (74a) is minimal, and I will suppose it is the same in Table 4 (b) : we do not have a causal chain, but merely two eventualities, linked by a causal relationship. There is no complex relation the eventualities can be said to be a participant in, insofar as causal relations are always established outside the level of argument structure. Given that variables *x* and *y*

¹⁰ For this reason, I preferred to use the nominal predicate **instance** instead of the verbal **instantiate**.

¹¹ The fact that a verb can be passivised does not imply that it involves a causal chaining cf. (i) *Marie est concernée par cette histoire* ‘Marie is concerned by this story’.

¹² Various parameters such as temporal precedence, aspectual nature of the eventualities, etc., not to mention encyclopedic knowledge, condition the appearance of the causal reading in question.

¹³ This is the reason why no verb subcategorises for a causal sentence introduced by *because*.

in Table 4 (b) do not correspond to participants, as is the case with ordinary argument structures, they cannot be interpreted as Agent or Patient either.

If we agree with the analyses just given, we can conclude that no adjective suffixed by *-EUX* that share the representations postulated in Table 4 and 5 satisfies constraint C2. On the other hand, these adjectives satisfy constraints C1 and C3.

7.2. The puzzling cases

What I would like to show now, is that this conclusion extends to cases where the interpretation of the NP is given by the general rule (70). Normally, this rule is triggered by HdNs denoting an event. Two types of examples are worth examining. The first one is given in (75). In these NPs, the (semantic translation of the) BseN functions as an argument of the predicate associated to the HdN. For instance, if the translation of *vente laiteuse* is (76a), the interpretation we get is (76b).

(75) **vente laiteuse*

**production cotonneuse*

(76) a $T(VENTE LAITEUSE) = (\lambda N. \lambda A. \lambda e. \lambda x/y. N(e,x,y) \wedge A(x/y))(\lambda y. \lambda x. \lambda e.$
 $\text{sell}(e,x,y))(\text{milk})$

b $(\lambda e. \text{sell}(e,x,y) \wedge \text{milk}(y))$

But this interpretation generates a clash between the satisfaction of constraint C2, which is implied by the rule's application, and the fact that the adjective imposes a type C1 (i) relationship upon the NPDA through constraint C1. Therefore sentences (75) are predicted to be ungrammatical. The second type includes the puzzling examples (31), to which I have added a few others :

(77)	a	<i>fermentation vineuse</i>	‘vine fermentation’
	b	<i>averse neiguse</i>	‘snowfall’
	c	<i>émanations sulfureuses</i>	‘sulphur dioxide emanations’
	d	<i>coulée boueuse</i>	‘mudslide’
	e	<i>pression gazeuse</i>	‘gas pressure’
	f	<i>échange gazeux</i>	‘gas exchange’

Suppose that the Ns *fermentation* and *averse* are translated as (78a) and (78b) respectively. NPs (77a, b) would receive interpretation (79a, b) through application of rule (70).

(78) a $T(\text{fermentation}) = (\lambda x. \lambda e. \text{ferment}(e,x))$

b $T(\text{averse}) = (\lambda x \lambda e. \text{fall-from-sky}(e,x))$

(79) a $T(\text{fermentation vineuse}) = (\lambda e. \text{ferment}(e,x) \wedge \text{vine}(x))$

b $T(\text{averse neiguse}) = (\lambda e. \text{fall-from-sky}(e,x) \wedge \text{snow}(x))$

Although the (semantic translation of the) base noun is an argument of the verb in these representations, the verbs are typically non agentive. They do not describe a scenario involving a causal chaining, but a situation where a natural process takes place, by itself, without the intervention of external factors, be they human or whatever. This amounts to saying that there is no causal chaining here. For this reason, and even though the nominal argument in (79) fulfils the conditions of Patienthood (Davis & Koenig

2000), constraint C2 is not satisfied. But it should be noted that these NPs also satisfy constraint C1, insofar as the event the HdN denotes corresponds to an intrinsic property of the base noun's referent. For instance, vine is known to ferment, snow to fall, mud to slide, and so on. On the contrary, constraint C1 was not fulfilled in (75). To cope with examples (77), we must adjust a little constraint C1. Whereas cases dealt with in C1 (i) were limited to states, these examples show that intrinsic properties have to include processes as well. In all cases where the HdN denotes an event, rule (70) applies and the BseN's denotatum is a participant in the event. But only events involving a causal chaining establish an external relationship. The distinctions just mentioned are summed up in table 6 below.

As some readers certainly noticed, the verbs that allow expressions (77) to exist belong to the set of verbs that have been dubbed « verbs of internal causation » by (Levin & Rappaport Hovav 1995). Morphology offers a new and unexpected support for distinguishing this verb class from others.

Examples	Event	BseN = participant	Internal rel.	Causal chn.
<i>voyage présidentiel</i>	+	+	–	+
<i>fermentation vineuse</i>	+	+	+	–
<i>*vente vineuse</i>	+	+	+ !	+ !
<i>lac poissonneux</i>	–	–	+	–
<i>pont dangereux</i>	–	–	+	–
<i>enfant peureux</i>	–	–	+	–

Table 6. Types of relations between HdN and BseN

Grammatical examples (68) can be dealt with along the lines of the proposal devised for (31), namely the cases where the HdN denotes an event. In (68) the spatial prefix adjoined to the adjective imposes a locative reading to the whole NP : it makes the referent of the BseN a Ground where the denotatum of the HdN takes place (if it is an event e.g. *pique*, *expédition*) or is located (if it is an object e.g. *gazoduc*). A detailed account of these facts is left for future research.

The explanation of the ungrammaticality of (32) and (69) will not be touched upon here because this would lead us to undertake an examination of the scalarity in relation with denominal adjectives, an issue that lies beyond the limits of this paper.

7. Conclusion

The following points can be drawn from the discussion:

1. The puzzling behaviour of the adjectives suffixed by *-EUX*, which behave sometimes as plain qualifying adjectives, sometimes as relational adjectives, can be accounted for if we pay attention to the semantic relationship between their BseN and their HdN.
2. The gist of my proposal is that they are plain qualifying adjectives whenever the relationship in question does not involve a scenario, be it with a causal chaining or not, and conversely, that they are not whenever it does.
3. Verbs of « internal causation » proved to be important in the argumentation as a subclass of predicates that do not involve a causal chaining. This shows that morphology can use operational semantic distinctions made elsewhere in the grammar to achieve its own purposes.

4. The discussion of the data has shown that the properties of derived adjectives hinge on very fine-tuned semantic parameters. Consequently, the adjectives in question cannot be classified into a lexical category once and for all. This pleads for a dynamic approach of semantics at the morphological level too.
5. The preceding findings cast doubt on the existence of relational adjectives as a category of its own. What people usually denote by this term could be no more than a set of properties that pattern together.

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